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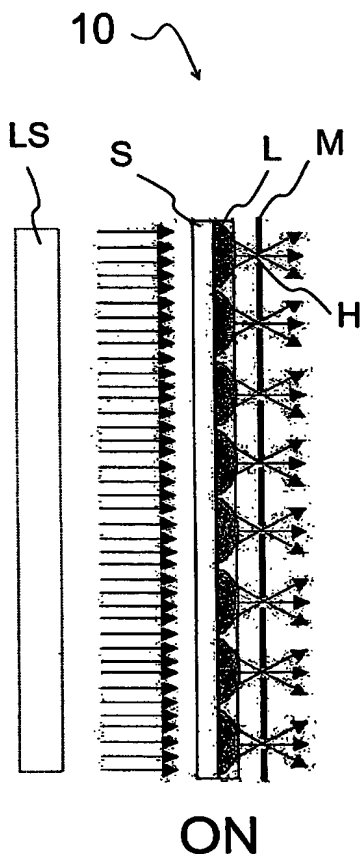
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[Continued on next page]

(54) Title: SWITCHABLE LENS DISPLAY



(57) Abstract: The display device (10,20,30) according to the invention comprises at least a layer of substantially transparent substrate (S), a pinhole mask (M) carrying an array of pinholes (H) and arranged in front of said substrate (S) each pinhole (H) corresponding to a single pixel, and an array of electrically controllable refractive or diffractive lenses (L) or corresponding optical components arranged between said substrate (S) and said pinhole mask (M) to affect in an electrically controlled manner the divergence of the light travelling through said substrate (S) towards said pinhole mask (M). The invention may be used to create transmissive, reflective or fluorescent displays with high contrast and high brightness.

WO 2004/019120 A1

WO 2004/019120 A1



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

National application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G02F 1/1335, G02B 26/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G02F, G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4613207 A (J.L.FERGASON), 23 Sept 1986 (23.09.86), see the whole document --	1-10
A	US 5929962 A (G.LIANG-TAI CHIUET AL), 27 July 1999 (27.07.99), see the whole document --	1-10
A	US 5731857 A (J.H.M. NEIJZEN), 24 March 1998 (24.03.98), see the whole document -- -----	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	4613207	A	23/09/86	AT	112398 T	15/10/94
				AT	173123 T	15/11/98
				AU	4351685 A	28/11/85
				CA	1257372 A	11/07/89
				DE	3587931 D,T	02/03/95
				DE	3588202 D,T	05/08/99
				EP	0179903 A,B	07/05/86
				SE	0179903 T3	
				EP	0597504 A,B	18/05/94
				SE	0597504 T3	
				JP	2624929 B	25/06/97
				JP	2669430 B	27/10/97
				JP	7072444 A	17/03/95
				JP	61502286 T	09/10/86
				US	4693557 A	15/09/87
				US	5016984 A	21/05/91
				US	5061041 A	29/10/91
				WO	8505192 A	21/11/85

US	5929962	A	27/07/99	NONE		

US	5731857	A	24/03/98	CN	1176008 A	11/03/98
				EP	0801765 A	22/10/97
				JP	10512377 T	24/11/98
				KR	258292 B	01/06/00
				WO	9716765 A	09/05/97